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PCT/DE2003/003774

**Translation****PCT****INTERNATIONAL PRELIMINARY EXAMINATION REPORT**

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference: N1002PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/DE2003/003774	International filing date (day/month/year) 13 November 2003 (13.11.2003)	Priority date (day/month/year)
International Patent Classification (IPC) or national classification and IPC G01N 29/02		
Applicant TECHNISCHE UNIVERSITÄT CLAUSTHAL		

<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>7</u> sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of <u>6</u> sheets.</p>	
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability: citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>	

Date of submission of the demand 01 February 2005 (01.02.2005)	Date of completion of this report 29 March 2006 (29.03.2006)
Name and mailing address of the IPEA/EP	Authorized officer
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1. Basis of the report

1. This report has been drawn on the basis of (Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.):

☒ the international application as originally filed.

☒ the description, pages 1-21, as originally filed,
 pages _____, filed with the demand,
 pages _____, filed with the letter of _____,
 pages _____, filed with the letter of _____.

☒ the claims, Nos. _____, as originally filed,
 Nos. _____, as amended under Article 19,
 Nos. _____, filed with the demand,
 Nos. 1-31, filed with the letter of 07 March 2006 (07.03.2006),
 Nos. _____, filed with the letter of _____.

☒ the drawings, sheets/fig 1/4-4/4, as originally filed,
 sheets/fig _____, filed with the demand,
 sheets/fig _____, filed with the letter of _____,
 sheets/fig _____, filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/fig _____

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

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V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-31	YES
	Claims		NO
Inventive step (IS)	Claims	1-31	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-31	YES
	Claims		NO

2. Citations and explanations

1. Prior art citations

Reference is made to the following documents:

- D1: ALTINDAL A ET AL: "Soluble dodecylsulfanylphthalocyanines as sensitive coatings for chemical sensors in gas phase", FREQUENCY CONTROL SYMPOSIUM, 1998. PROCEEDINGS OF THE 1998 IEEE INTERNATIONAL PASADENA, CA, USA 27-29 MAY 1998, NEW YORK, NY, USA, IEEE, US, 27 May 1998 (1998-05-27), pages 676-684, XP010305603 ISBN: 0-7803-4373-5
- D2: LEE Y ET AL: "The quartz crystal resonator as detector of electrical loading: an analysis of sensing mechanisms", FREQUENCY CONTROL SYMPOSIUM, 1996, 50TH. PROCEEDINGS OF THE 1996 IEEE INTERNATIONAL. HONOLULU, HI, USA, 5-7 JUNE 1996, NEW YORK, NY, USA, IEEE, US, 5 June 1996 (1996-06-05), pages 577-585, XP010199944 ISBN: 0-7803-3309-8
- D3: EP-A-0 416 160 (SIEMENS AG)
13 March 1991 (1991-03-13)

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D4: WO 97/45723 A (KIMBERLY CLARK CO)

4 December 1997 (1997-12-04)

D5: H. FRITZE, O. SCHNEIDER, H. SEH, H. L. TULLER,
G. BORCHARDT: "High temperature bulk acoustic
wave properties of langasite", PHYS. CHEM.
CHEM. PHYS., no. 5, 19 September 2003
(2003-09-19), pages 5207-5214, XP002292349.

2. Amendments (PCT Article 34(2)(b))

The amendments submitted with the letter of
1 March 2006 introduce substantive matter which,
contrary to PCT Article 34(2)(b), goes beyond the
disclosure in the international application as
filed. The amendment in question is as follows:

*that by means of the frequency measuring device only
the resonant frequency of an oscillation system in
the piezoelectric material can be detected (claim 1).*
The description as originally filed discloses that
*only the resonant frequency of a fundamental need be
determined in order to determine the nature and the
extent of an environmental influence acting on the
sensor (page 3, last line to page 4, line 2).* The
original claim 1 further discloses that, *by means of
a frequency measuring device, an oscillation system
in the piezoelectric material can be detected.* The
above amendment cannot be derived from these passages
and, for this reason, is not based on the application
as originally filed.

For the purpose of assessing novelty and inventive
step, therefore, the above feature has been
interpreted as follows:

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that, by means of the frequency measuring device, the resonant frequency of an oscillation system in the piezoelectric material can be detected.

3. Clarity (PCT Article 6)

- 3.1 Although device claims 1, 22 and 27 are drafted as separate independent claims, they seem in fact to relate to the same subject matter, the only apparent difference being in the form of optional features.

Claims 22 and 27 appear to contain all the features of claim 1 and should therefore be drafted as claims that are dependent on said claim (PCT Rule 6.4).

The claims are therefore not concise and fail to satisfy the requirements of PCT Article 6.

- 3.2 In claim 1, the wording "the effective electrode surface about the region of the sensor layer, by means of which the piezoelectric material can be excited into oscillation" lacks clarity. The reason is as follows:

this wording gives the impression that the measurement in question is passive, that is to say that the measurement is triggered by a change in the conductivity of the layer. According to the preamble and the description, however, the measurement is made with an excitation unit for generating oscillating potentials (page 12), the conductivity of the sensor layer influencing the resonant frequency of this oscillation (PCT Article 6).

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4. Novelty and inventive step (PCT Article 33(2) and (3))

The invention relates to a device (claim 1) and a method (claim 16) for detecting an environmental influence on a sensor by detecting a change in the electroconductivity of a sensor layer that forms part of the sensor.

The closest prior art, document D1, describes a similar device and a similar method, the sensor comprising a first and a second excitation electrode, a piezoelectric material arranged between the first and the second excitation electrodes, and a sensor layer which at least in parts contacts at least one excitation electrode as well as the piezoelectric material, said sensor layer comprising an excitation unit for generating electrical potentials, which are supplied to the piezoelectric material via the first and second excitation electrodes in order that the sensor layer can be excited into oscillation, and a frequency measuring device for detecting the resonant frequency of an oscillation system in the piezoelectric material.

Thus, claim 1 differs from D1 in that the sensor layer is made of an oxide ceramics, non-oxidic ceramics or semiconductor material, the change in conductivity thereof changing the effective electrode surface about the region of the sensor layer.

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The problem addressed by the present invention is that of improving the selectivity and the sensitivity of sensors and of providing a simpler measuring method.

This problem is solved by means of the device described in claim 1 and by the method described in claim 16 for the detection of an environmental influence on a sensor by detecting a change in the electroconductivity of a sensor layer that forms part of the sensor, said layer being made of oxide ceramics, non-oxidic ceramics or semiconductor material. Thus, instead of a shift of the resonant frequency resulting from a change in the mass of the sensor layer, as is usually the case in piezoelectric resonance sensors, a change in the effective electrode surface - and thus a shift of the resonant frequency - results from a change in the conductivity of the sensor layer.

This solution is not obvious to a person skilled in the art, nor is it evident from D1 in combination with other prior art documents.

Thus, claims 1 and 16 satisfy the requirements of the PCT in respect of novelty and inventive step (PCT Article 33(2) and (3)).

Claims 2-15 and claims 17-31 are dependent on claim 1 and therefore satisfy the requirements of the PCT in respect of novelty and inventive step (PCT Article 33(2) and (3)).

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5. Miscellaneous

- a. Pursuant to PCT Rule 5.1(a)(ii), the description should have cited the relevant prior art contained in documents D1 and D2.
- b. Contrary to PCT Rule 6.3(b), independent claim 16 is not drafted in the two-part form.

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